

High School Level Student Competition

2004-2005 School Year

NASA Langley Research Center's Aeronautics Directorate announces a new high school student competition for the 2004-2005 school year. The competition challenges students to characterize societal impacts resulting from widespread use of Personal Air Vehicles in the year 2030.

[http://avst.larc.nasa.gov/
competitions_high.html](http://avst.larc.nasa.gov/competitions_high.html)



National Aeronautics and Space Administration
Aeronautics Directorate
Langley Research Center
Hampton, VA
<http://avst.larc.nasa.gov>



Federal Aviation Administration
National Aviation Education Programs
<http://www.faa.gov/education/>

Overview

Teams or individuals from the US or its territories (public, private, or home-schooled students) are encouraged to submit an entry. The best entries will be selected for awards, but type of awards will be based on the availability of funds. Awards could include small cash prizes, guided visits to a NASA facility, student internships with NASA mentors, certificates of accomplishment, or attendance at a national aviation event such as AirVenture. Internships, cash prizes, and tours of government facilities would be restricted to US Citizens.

Students should submit a well-written, focused paper that describes how our future society might adapt to the widespread use of Personal Air Vehicles (PAVs). Underlying assumptions students should consider include: futuristic personal air vehicles are easy to use, are self-operated, safe to operate, fuel-efficient, less noisy than today's aircraft, less polluting than today's aircraft, and more affordable than today's aircraft. These futuristic assumptions are based on successful research and development programs begun in 2005 and tested with demonstrator aircraft every 5 years over the next 15 years, to prove the new technologies can be used by industry. Student projections should also assume a vibrant U.S. economy, plentiful energy resources, and an increased societal value for transportation that reduces travel time.

Futuristic scenario: New transportation choices in 2030

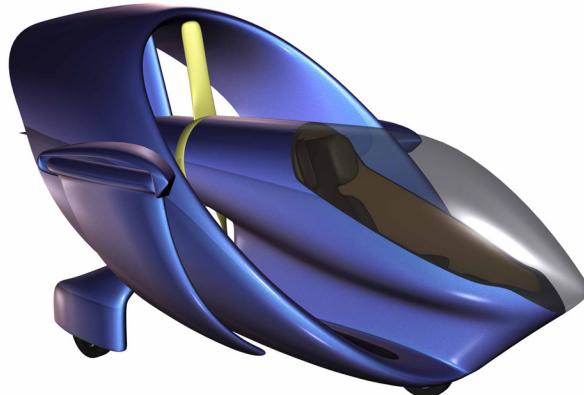
Working with NASA and university developed technologies, and working with the FAA and Homeland Security to ensure safe operations, industry has marketed at least three types of personal air vehicles that are as safe and easy to use as an automobile. All the vehicle costs are specified in current year dollars, so that they are directly comparable to existing aircraft costs.

- Near-term Next Generation General Aviation Aircraft:** A four-place aircraft that can fly at 200 mph, costs less than \$100,000, can use the more than 10,000 General Aviation airfields across the nation, achieves 25 mpg fuel efficiency using standard auto or diesel fuels, and makes no more noise than a motorcycle. *This compares to a current four-place aircraft that costs about \$350,000, requires at least six months of training to fly, is very loud, burns leaded gasoline, and consumes fuel at 13 miles per gallon.*



Artist concept of a conventional take off and landing personal air vehicle.

- Mid-term Gridlock Commuter Aircraft:** A two-seat recreational and commuter aircraft that can take off and land, clearing 35 ft. obstacles, in less than 500 feet, can travel on side streets at 25 mph, can fly at 150 mph, costs less than \$50,000, makes no more noise than a motorcycle, and has a fuel efficiency of 40 miles per gallon using automotive fuels. *Currently a vehicle that approaches this capability is the auto-gyro that carries 1 to 2 people at speeds less than 80 mph, can takeoff and land from almost any small grass field, but cannot travel on side-streets for door-to-door use.*



Artist concept of a single-seat commuter/recreational vehicle.

- Piloted Vertical Takeoff and Landing (VTOL) Air Taxi:** A five-passenger piloted air-taxi capable of vertical takeoff and landing, quiet enough to takeoff and land just 500 feet away from residences or businesses, can fly at a 250 mph cruise speed, and costs one million dollars per vehicle. *This compares to a helicopter today that can carry four people, travel at speeds up to 125 mph, costs about \$1 million, but can takeoff and land only in very restricted areas because of how much noise it makes. Helicopters are extensively used today for police, news, and ambulance services?*



Artist concept of a vertical take off and land air taxi.

Challenge to Students:

1. Choose one or more of the vehicles described above and describe how society would adapt to these types of vehicles.
2. Describe the positive and negative impacts on everyday life that our society would experience with the widespread use of personal air vehicles. Indicate how your personal life would be different than it is today.
3. Include a brief section (no more than two pages) to demonstrate that students have done Internet research using current government and travel agency studies* to understand:
 - Auto and airline use to meet travel needs in our current society;
 - Expert projections for travel using autos and airlines over the next 25 years; and
 - Projected congestion and mobility problems unless alternate transportation solutions are investigated.
4. Include a bibliography or list of references, including URLs, questionnaires, oral interviews, and any other sources other than student's opinion.*

Helpful Hints:

To help focus their papers, student can begin by choosing **one or two** of the following questions to address. These questions are offered as a starting point to help students generate ideas, they are not meant as a format for the paper. The paper is limited to 7 pages so students should limit their responses to areas that most interest them. A list of questions to help students frame their study is available on the web site.

Resources, Dates, and Eligibility

Resources

- Periodicals like Popular Science, Science News, Scientific American, and major news magazines may contain useful information.
- Phone or Internet-based interviews with researchers at NASA, the US Air Force Research Laboratory, the Department of Transportation, the Department of Energy, the Environmental Protection Agency, the Federal Aviation Administration, aircraft manufacturers, rotary craft manufacturers, etc. may provide useful information.
- State and local transportation system officials may provide insight into the issues of bringing personal air vehicles into common or widespread use.
- An extensive set of internet based resources and other resources are available on the website:

[http://avst.larc.nasa.gov/
competitions_high_resources.html](http://avst.larc.nasa.gov/competitions_high_resources.html)

Dates

- Letter of intent to enter by January 15, 2005
Letters of intent can be e-mailed to
e.b.ward@larc.nasa.gov
or mailed to
Competition Administrator
Mail Stop 254
NASA Langley Research Center
Hampton, VA 23681
- Entries due no later than April 15, 2005
- Winners will be notified prior to May 15, 2005

Eligibility

- The competition is open to any US high school or secondary school student or team of students. This includes schools on US military installations abroad and home-schooled students.
- Students from foreign secondary schools may enter if they partner with a US school and provide a letter of support from both their school and the US school (letter from the school's administrator).

Submission Guidelines

Student submissions shall be treated as being free of restrictions and limitations on their use, reproduction, and publication.

- Title page listing School Name, Team members, Teacher's name, Address of School, and email contact for student team leader and teacher.
- All papers must be submitted digitally as MS Word or Word Perfect documents. Hard copies will be accepted only from schools or students that do not have access to the necessary software and arrangements must be made in advance for hard copy submission.
- At least five but no more than 7 pages, typed, single-spaced, no less than 10 pt. font, one-side only--page requirement excludes title page, graphics, and reference pages.
- All pages except title page numbered in the lower right hand margin.
- All references in the paper should be footnoted using a college level writing style manual or the English handbook accepted by their school's English department.**

Digital copies should be sent to e.b.ward@larc.nasa.gov
All Hard copies, CDs and/or zip disks should be sent to (fax copies will not be accepted):

Competition Administrator
Mail Stop 254
NASA Langley Research Center
Hampton, VA 23681

*A collection of potential resources is available in the Resources, Dates, and Eligibility section.

**Consult the Resources, Dates, and Eligibility section for suggestions.

Criteria for Evaluation

Entries will be evaluated on how well they have focused their project and how well they have addressed all four required elements. Each project will be judged on its own merit by a group of federal, university, industry, and other expert representatives. All entries should include a brief review of current literature. In addition to following the format for submission, award level entries will be well written, thorough and concise.

Awards

- NASA will determine the amount and number of cash awards based on the availability of funds.
- Each winning team will be awarded a trophy and each member of the team will be given a certificate to commemorate their achievement.
- Winning entry teams may be invited to visit a NASA research facility to participate in an education activity.

Past Award Winners



Participants at the 2004 Student Competition Awards and Presentations included teams from Kee High School, Southwest Virginia Governor's School, Cornell, Georgia Tech, Ohio University, Montana State, Penn State, Virginia Tech, and Loughborough University.

2004 Best Overall

Ryan Olson
Southwest Virginia Governor's School
Dublin, VA
The Past as Future

2004 1st Place, Tie

Brian Yung
Bergen County Academies, Hackensack, NJ
Hybrid STOVL Design
Robert Briggs
Clover Hill High School, Midlothian, VA
Design a Flying Car

2004 2nd Place, Tie

*Brandon Dommick, Frederico Gonzalez, Nick Vallani,
Brian Riley, and Brian Treffry*
Emerald Ridge High School, Puyallup, WA
Inferno PT-6X
Jacob A. Monat and Matthew M. Kruse
Kee High School, Lansing, IA
Pegasus

2004 3rd Place, Tie

*Gregory Brill, J. T. Segal, Tim Crabtree,
Stephen Choi, and Tony M*
Lake Braddock High School, Burke, VA
NASA Flying Car

Lake Singh
Lake Braddock High School, Burke, VA
Air Ground Hybrid

Eric Eichelberger and Charles Lincoln
Lake Braddock High School, Burke, VA
LBo5 Flying Car

2004 Honorable Mention, Tie

Evan Stalker
Crosby-Ironton High School, Crosby, MN
A Flying Car
*Elizabeth Workman, James Moore,
Bernard Murphy, and Addison Haab*
Lloyd C. Bird High School, Chester, VA
Conceptual Flying Car

Nicole Lee, Erin Teigen, and Ricky Sessions
Lloyd C. Bird High School, Chester, VA
Flying Beetle

Desmond Jenkins, Ike Anderson, and David Myers
Trinidad High School, Trinidad, TX
JAM